STATE OF MAINE PUBLIC UTILITIES COMMISSION

DOCKET NO. 2019-00015

CENTRAL MAINE POWER COMPANY
Investigation of Central Maine Power Company's Metering and Billing Issues

INITIAL TESTIMONY ON METERING AND BILLING ISSUES

May 8, 2019

Testimony of

Linda Ball
Jayme Holland
Nicholas Levesque
Mark Morisette

On behalf of
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*These exhibits contain confidential and proprietary information of GE/Aclara and are being provided pursuant to the terms of Temporary Protective Order No. 2 (Confidential and Proprietary Vendor Business Information), issued on February 22, 2019.

Witness Panel and Introduction

A. Please identify the Witness Panel and Qualifications.

This rebuttal testimony is provided by a panel of four witnesses on behalf of Central Maine Power Company ("CMP or the "Company"): Linda Ball, Jayme Holland, Nicholas Levesque, and Mark Morisette.

Linda Ball is Director of Smart Metering for the Avangrid companies and has been with the companies for 22 years holding a number of customer service positions prior to her current position.

Jayme Holland leads Customer Service Quality for the operating companies of Avangrid Networks and has been with CMP for 6 years.

Nicholas Levesque is Manager, Regional Operations – Customer Service at CMP. Mr. Levesque is responsible for all aspects of field meter operations including field meter reading, testing, turn-on, turn-off, collections, customer requested meter work, new connections and inspections. Mr. Levesque also oversees meter services, which covers transformer-rated metering and net energy billing meter installations, as well as meter lab responsibility for acceptance and in-service testing of metering. Mr. Levesque joined Central Maine Power Company in 2005.

Mark Morisette is Manager, Smart Metering, at Avangrid. Mr. Morisette is responsible for all aspects of metering systems, including Meter Data Management System (MDMS), MV90, the Electronic Meter Reading System (FCS), and aspects of the Trilliant AMI Head End System currently at CMP. Mr. Morisette joined Central Maine Power Company in 1992.

Curriculum Vitae for each member of the panel are provided in Exhibit 1 to this testimony.

B. Please describe the purpose of your testimony and provide an overview of your testimony.

CMP is submitting this testimony pursuant to the Maine Public Utilities Commission ("MPUC" or the "Commission") Order and Notice of Investigation ("Order") issued on January 14, 2019 in this proceeding. Through its Order, the Commission initiated a full investigation, in accordance with 35-A M.R.S. § 1303(2), into metering and billing issues affecting customers of CMP since October 2017.

The Commission's Order puts this investigation into context. The Order notes that in late October 2017, CMP went operational with its new integrated customer service and billing program referred to as the Customer Information System ("CIS") and also known as SmartCare. In the subsequent months, the MPUC's Consumer Assistance and Safety Division ("CASD") received complaints from CMP's customers alleging high bills and possible billing errors. Some customers also complained about difficulties in both reaching CMP and having their issues resolved. The Order explains that on March 1, 2018, the Commission initiated a summary investigation into CMP's metering, billing and customer service issues in *Maine Public Utilities Commission, Investigation of Central Maine Power Company Metering, Billing and Customer Communication Issues*, Docket No. 2018-00052. Given the technical nature of the issues, on March 22, 2018, the Commission issued an order initiating a technical or forensic audit to address CMP's metering and billing issues. The Commission subsequently retained the Liberty Consulting Group ("Liberty") to perform an audit of CMP's metering and billing

functions.[1] As discussed in more detail below, the Commission's March 1, 2018 Order identified eleven specific issues that the Commission sought to evaluate. They include metering, billing, and customer communications issues that focus in large part on the accuracy of CMP's meters and CIS and the adequacy of CMP's customer communications during the role-out of CIS in October 2017 and in subsequent months.

The Liberty Audit Report, which was issued on December 20, 2018, was extensive and thorough. In summary, as related to the metering and billing concerns, Liberty concluded:[2]

- CMP's meters produce accurate measurements of customer usage. However, in very uncommon circumstances, one of CMP's meter types may register usage inaccurately. This anomaly may have produced instances of inaccurate metering in the low thousands since installation of those meters starting in 2010. Those errors, while possibly having a metering effect for a small number of customers, on an overall basis would not materially affect the billing results.

- CMP's meter-related databases and communications systems accurately, completely, and timely collect and store usage and transmit it accurately, completely, and timely to the CMP CIS.

- For bills issued, billing error rates for delivery and for fairly standard supply arrangements proved minimal.

- Liberty's analysis showed usage at levels consistent with the expectations that the cold weather of winter 2017–2018 would suggest. In addition, supplier rates also increased substantially at that time, which compounded the billed effects of higher than typical usage. According to Liberty, weather and rate changes, not meter or AMI system error, caused high usage registration and rates across the system as a whole.

[1] The audit scope was later expanded to include customer communications issues. *See Maine Public Utilities Commission, Investigation of Central Maine Power Company Metering, Billing and Customer Communication Issues*, Docket No. 2018-00052, Order Modifying Scope of Audit (July 10, 2018).
[2] Each of these findings are contained in the "Major Conclusions" noted on page 6 of the Liberty Report.

As for CMP's roll out of its SmartCare system, the Liberty Audit found the following:[3]

- However, significant gaps in SmartCare testing and training, and in the transition to it, produced in its initial phase of operation an unnecessarily large number of errors, which required lengthy manual correction before bill issuance.

- A shortage of personnel contributed to the inability to eliminate errors before the SmartCare go-live date. Continuing shortages of experienced personnel after go-live unduly delayed fixes to the errors, caused customers significant difficulty in reaching CMP representatives and in getting answers to questions and concerns, and created excessive delays in resolving billing problems. Customer performance metrics fell below norms and remained so for some time, including to today.

- The extent and degree of performance degradation contributed strongly to a level of customer frustration, doubt, and skepticism that was already high due to uncharacteristically large bills in winter 2017–2018.

In response to the above findings, the Order identified certain issues that the Commission found warranted further examination in this full investigation. The Order states:

> As part of its audit, Liberty found metering anomalies, referred to as "fast clock issues," with certain CMP meters under certain conditions. In addition, Liberty found significant problems resulting in billing exceptions which resulted from CMP's rollout of its CIS. The causes and ramifications of these issues warrant further examination.
>
> While Liberty did not find a systemic billing or metering problem that would have resulted in high bills complained of by customers, it is appropriate to allow the parties, as part of a separate adjudicatory

[3] *Id.*

proceeding,[4] to explore the basis of Liberty's findings regarding metering and billing issues.[5]

As discussed in CMP's testimony below, the Company agrees with Liberty's findings that CMP's metering and billing systems have been operating accurately and that the higher usage/bills that some customers have experienced are related to weather and supply rate changes and not to meter or billing system errors. CMP's testimony responds to the limited number of concerns raised by Liberty regarding the Company's meter and billing systems and as further discussed above, by the Commission in its Order. CMP's testimony also responds to the Liberty findings regarding problems with CMP's roll-out of its new billing system – in particular the number of billing exceptions that CMP had to fix before sending out customer bills, which, in turn, delayed some customers in receiving their bills, and an insufficient number of well-trained customer service representatives to respond to customer concerns in a timely way. CMP acknowledges up-front that there were billing exceptions that caused delays in some customers receiving their bills and that CMP should have done better in providing customers timely responses to their concerns. Importantly, while some customers may have received their bills late (in order for CMP to correct any identified exceptions before the bill was sent to the customer) and some bills may have contained presentation errors (meaning the charges to the customer were correct but a piece of information on the bill not related to the amount

[4] Certain aspects of the SmartCare related issues are being addressed in Docket 2018-00194. CMP's testimony in Docket 2019-00015 will address issues associated with SmartCare development and implementation as well as any errors in bills sent to customers.
[5] Order, p. 8.

due or the due date was incorrect), only three billing errors led to customers being charged a wrong amount for their usage or for the wrong amount of usage. These three errors are discussed further in testimony below. Whenever customers were over billed, corrections were made as quickly as possible to correctly bill the customers.

Rebuttal Testimony

A. Meter Accuracy

The Liberty Audit found that CMP's meters are and have been accurately measuring customer usage and that CMP's meter testing protocols meet or exceed established standards. Please comment on Liberty's findings.

CMP agrees with Liberty's assessment that its meters are and have been accurately recording customer usage and that CMP's meter testing protocols meet or exceed established standards. Furthermore, CMP feels that the provisional adoption of Chapter 320 and repeal of Chapter 32 and the changes to meter testing requirements contained within the new Chapter 320 will provide further guidance on how exactly future meter testing programs are to be applied.

The Liberty audit examined CMP's historical random sample meter testing processes, procedures, and results, and CMP's meter testing of "complaint" meters, and performed, in conjunction with CMP, a field meter test of 60 randomly selected meters. Each of these testing aspects validates that CMP's processes and procedures are appropriate and that CMP's meters accurately record customer usage and have done so consistently. We discuss below the individual components of CMP's thorough meter testing process.

Please describe CMP's Pre-Service acceptance testing of meters and what standards are applied.

CMP's pre-service acceptance testing not only meets the minimum standard of requiring a manufacturer test record for each meter but exceeds the minimum Chapter 32 and American National Standards Institute ("ANSI") C12.1 standard for code for electricity metering and tests a sample of the meters to ensure manufacturer reliability, sometimes in as high as a 100% sample.

Liberty found that CMP's meter testing practices for in-service meters is compliant with Commission requirements and meets or exceeds other utility practices. Please provide additional details on CMP's in-service meter testing and testing done on meters for which customers complained of high usage.

CMP tested more than 61,000 meters[6] between 2013 through 2017 and was fully compliant with MPUC Chapter 32 regulations as well as with a February 12, 1962 waiver allowing CMP to replace a 10-year requirement for testing in-service metering with a sample program. CMP's current testing procedures are also compliant with ANSI C12.1 which will likely be adopted as part of the provisionally adopted Chapter 320 very soon. CMP's lab testing equipment is assessed and calibrated by an independent third party and is done so 12 times more often than national standards require, in order to ensure extremely high quality and reliability.

[6] Liberty Audit Report, p. 18.

While Liberty concluded in its Audit Report that at least 98% of meters tested between 2013 and 2017 tested within tolerance limits of +/-2%,[7] in fact 99.9% of meters testing in that period met the +/-2% accuracy requirements. In addition to examining the Company's historical meter testing results, Liberty also examined meter testing results for those customers who contacted the Company with a concern about their usage and who requested that their meter be tested. CMP tested 2,295 meters between October 2017 and June 2018, in response to customer requests. As Liberty observes in its Audit Report, each of the 2,295 AMI meters successfully tested within the +/-2% tolerance limits.[8]

Liberty elected to observe field meter testing on 60 meters randomly selected by Liberty in order to corroborate CMP's documented meter testing results obtained through pre-acceptance testing, random sample meter testing and complaint meter testing. The random sample was selected by Liberty to ensure high statistical confidence that the sample would be representative of CMP's meter population. Please explain the process in which Liberty observed CMP's field meter testing.

In performing the field meter testing, Liberty first confirmed that meter testing equipment was properly calibrated. Liberty then witnessed field meter tests performed by trained CMP personnel at each of the 60 locations. Liberty confirmed that all 60 randomly selected meters successfully tested within the +/-2% tolerance limits. Liberty further validated that in all 60 tests, the meter display date and time were accurate, and

[7] Liberty Audit Report, p. 18.
[8] *Id.*

that the meter read observed in the field matched the meter read communicated back to CMP's Head End System ("HES").[9]

Liberty observed that meter testing equipment should be calibrated regularly according to the ISO New England Operations Procedure Number 18, Section 9 and that CMP's meter testing equipment conforms to the ISO requirements. Please explain CMP's procedure should a piece of meter testing equipment be found to be improperly calibrated.

CMP agrees with Liberty's conclusion that its practices meet the standards established by the ISO New England Operations Procedures, that its equipment calibration practices are effective and has shown minimal risk of producing error. CMP also agrees that there is no commonly established procedure for addressing possible accuracy testing error in cases where an improperly calibrated device has been identified. This type of occurrence is extremely rare and the volume of meters tested per test kit between calibration testing is typically quite low. All complaint meter tests are also covered under other testing programs that provide some level of redundancy and provide CMP with a high level of confidence regarding testing accuracy.

B. AMI Meter Communications with SmartCare

The Liberty Audit examined CMP's AMI system to determine if AMI meters were accurately communicating with the SmartCare system. Please discuss and explain the various aspects of the AMI system examined by Liberty and comment on Liberty's conclusions.

[9] Liberty Audit Report, p. 16-17.

Liberty confirmed that not only are CMP's meters accurately recording customer usage, but also that CMP's AMI system is successfully transmitting meter information to the Head End System. In all cases, Liberty found that the AMI system was successfully communicating information. Specifically, Liberty found:

- The percent of bills based on actual AMI reads communicated to the SmartCare system averaged greater than 98% through May 2018;[10]
- CMP's estimation rate (due to an inability to read a meter or inability to communicate the read back to the SmartCare system) has averaged 1.0-1.3% since 2016, well below previous targets of 6% estimated bills;[11] and
- AMI Network availability is consistently >95% since 2016.[12]

Liberty also examined the accuracy of customer usage information in the SmartCare system, to validate that the information was flowing not only successfully but also accurately from the AMI system and Field Collection System ("FCS") to SmartCare for billing. Liberty utilized an extensive extract of 3.8 million records of customer billing information drawn from the SmartCare system to validate that the SmartCare information correctly matched information recorded in each of the supporting systems. Specifically, Liberty matched extracted data to the HES source data, the Meter Data Management System ("MDMS") source data, the FCS source data, and the SAP SmartCare System source data for 400 randomly selected accounts.

- **Head End System**

  100% of accounts were verified as having the same result in the HES as in the SmartCare extract.[13]

- **Meter Data Management System**

[10] Liberty Audit Report, p. 33.
[11] Liberty Audit Report, p. 34.
[12] Liberty Audit Report, p. 37.
[13] Liberty Audit Report, p. 39.

100% of accounts were verified as having the same result in the MDMS as in the SmartCare extract, verified through real time MDMS access.[14]

- **Field Collection System**
  The FCS system is used to obtain meter readings for customers whose meters cannot be read by AMI. In some cases this is due to a customer opting out of having an AMI meter. 100% of accounts were verified as having the same result in FCS as in the SmartCare extract.[15]

- **SAP SmartCare System**
  100% of accounts were verified as having the same result in the SmartCare system as were recorded in the SmartCare extract.[16]

Liberty concluded, and CMP agrees, that data has flowed accurately from its source systems to the SmartCare billing system.

C. Meter Anomalies

Liberty identified a very uncommon condition whereby customer usage could be inaccurately recorded, which Liberty refers to as "meter anomalies". Please provide background on how the anomalous condition occurs and how it can be identified.

During the course of the Liberty Audit, CMP discussed with the Liberty auditors an uncommon issue which was being actively investigated by the Company. Liberty refers to this uncommon issue and the symptom by which the issue can be identified, as "meter anomalies." Liberty identifies two meter anomaly modes, Fast Clock anomaly and Register anomaly. It is CMP's opinion that these two are one and the same, with Fast Clock being merely the visual symptom by which Register anomaly

[14] Liberty Audit Report, p. 39-40.
[15] Liberty Audit Report, p. 40.
[16] *Id.*

would be identified. Herein, CMP will use the terms "anomalous mode" or the "meter anomaly" to discuss both terms used by Liberty, Fast Clock and Register anomaly.

Clock Drift

Please explain the condition CMP calls Clock Drift and explain its relationship to the meter anomaly.

Clock Drift is a normal – and completely benign – occurrence whereby electronic digital equipment with an internal clock does not run at exactly the same rate as the system or reference clock for that device. As a result, the device clock "drifts apart" from the system clock. An example of ordinary clock drift would be a digital microwave clock. The clock may be set at exactly 12:00 to match another clock, yet on a following day the microwave may be a minute ahead or behind the clock it was originally matched up with. Clock Drift has no impact on usage registration.

AMI meters have an ability to periodically self-correct their internal clock to sync up to their reference clock. When a meter is not successful in self-correcting, manual intervention may be needed to remotely reset the meter time to correct Clock Drift. CMP follows an established process by which meters in Clock Drift which cannot self-correct are reviewed and corrected daily by CMP personnel.

Meter Anomaly

Please explain how Clock Drift differs from meter anomaly and how CMP became aware of the difference.

CMP offers the following definitions to facilitate understanding of the subsequent sections of testimony:

Clock Drift – a benign condition which results in a meter clock being ahead of or behind the actual time. Clock Drift has no impact on the amount of usage being recorded by the meter.

Fast Clock – synonymous with Register Anomaly or Meter Anomaly; meters in Fast Clock mode consistently gain 12 minutes every hour, so appear to be in Clock Drift mode, but in fact are operating in an anomalous mode leading to potential usage inaccuracy.

Register Anomaly or **Meter Anomaly** – synonymous with Fast Clock; meters in anomalous mode have the potential for usage to be under or over recorded.

These terms have been used differently in the past, as CMP became aware of the difference between Clock Drift and Fast Clock and as CMP's knowledge of the potential meter anomaly mode has evolved.

Events in early 2018 led to CMP's meter manufacturer advising CMP that what was known by CMP to be Clock Drift may in fact be a different condition, now known as the meter anomaly. In March 2018, a daily system report showed 352 meters in a common geographical area in what appeared to be Clock Drift mode. Given the larger than usual number of meters in this state, CMP began investigating, including calling upon its meter manufacturer for assistance in understanding the large number of meters in Clock Drift mode. CMP had extensive discussions with the manufacturer over the next several months, working to identify the root cause of the issue and potential customer impacts (see Confidential Attachment 1 to TLCG-018-134, which

documents the communications between CMP and GE/Aclara[17]). On June 15, 2018, Aclara provided to CMP its White Paper, provided herein as Exhibit 2, which identified that the meter situation which CMP had known to be Clock Drift could in fact be meters in an anomalous state, which could result in errors in the amount of usage being recorded. Aclara recommended that I210+c meters be upgraded to firmware release 7.0 or higher to eliminate vulnerability to the meter anomaly.

Liberty notes on page 22 of its Audit Report, "We do not find substantial documentation of management's awareness of the GE meter issues or efforts to address them until 2014." Please respond.

The Company suggests that a more accurate statement would be '*we found <u>zero</u>* documentation of management's awareness ...' to accurately reflect the fact that the Company had no awareness of the issue whatsoever until August 2014, at which time the Company engaged GE to investigate meters subsequently determined to be in Clock Drift mode.[18] In response to questions from CMP, GE provided its Engineering Analysis Report on October 24, 2014, attached hereto as Confidential Exhibit 3.

When the 2014 GE Engineering Analysis was received, it was, as agreed by Liberty, "notably short on detail.[19] In fact, the GE Engineering Analysis recommended that the "erroneous clock speed condition" be corrected by resetting the meter and in its analysis discussed "time drifting after being set." GE advised that "the cause for the erroneous

[17] General Electric or GE, was acquired by Aclara; references throughout the document may be to GE or Aclara or GE/Aclara.
[18] Liberty observes in its response to CMP-001-006 that CMP referred to "fast clock" in its communications with GE in 2014, incorrectly concluding that CMP was using the term as Liberty does in its Audit Report. In fact, as discussed in this section, CMP's reference to fast clock in 2014 was understood by CMP to impact only the meter clock time, i.e., Clock Drift, not usage registration.
[19] Liberty Audit Report, p. 22.

clock speed has been addressed in recent firmware enhancements" and recommended that meters be upgraded to version 2.5.1.9 patch 9.0.3 (otherwise known as version 2.5.9). The 2.5.9 Release Notes were submitted within CMPFA-18-081 in Docket No. 2018-00052 and are attached here as Confidential Exhibit 4. Until such reprogramming could be achieved, GE advised that "CMP can clear the effect of the condition, when it occurs, by executing the procedure described in the Short-Term Correction section of this report" (i.e., the manual meter reset process which CMP utilizes).

Notably, the 2014 Engineering Analysis Report refers exclusively to impacts to the meter clock and time drifting; there is no identification of customer impacts or potential impact to registration. The Engineering Analysis Report recommends meters be upgraded to meter firmware version 2.5.9, which also did not mention potential customer impacts due to meter registration. The Company maintains that it reasonably relied upon information provided by its meter manufacturer. With a GE Engineering Analysis Report in hand, and having no reason to believe the report was anything other than completely factual, CMP had no reason to believe there was any impact to usage due to the clock drift condition.

Liberty concludes CMP should have undertaken in 2014 the steps taken in 2018, and thus been aware of the meter anomaly issue sooner.[20] CMP objects to this conclusion, gained only with the benefit of hindsight. CMP's knowledge gained in 2018 should not be a basis for assuming that same knowledge was or should have been available years prior. The very fact that CMP undertook a rigorous investigation in 2018, including

[20] Liberty Audit Report, p. 23.

pressing the meter manufacturer for a comprehensive explanation, demonstrates CMP management's dedication to investigating known or perceived issues to the fullest extent. Given that management did not undertake such investigation prior to 2018 leads to a logical conclusion that there was not adequate information provided in 2014 to warrant such an undertaking.

Liberty also claims that CMP should have known about this issue as early as 2012. Please respond.

Liberty comments on page 21 of the Audit Report that "It is difficult to imagine an intentional GE decision not to make the (2012 Release) notes available generally to purchasers and end users of the affected meters" and "We consider it much more likely, but not necessarily certain, that GE sent the 2012 release notes, but they somehow escaped the attention of responsible CMP personnel until several years later."

The June 15, 2018 email from Aclara to CMP supports CMP's position that it did not receive the 2012 Release Notes until 2014. The Aclara email states, "In 2014 Aclara Meters **provided** (emphasis added) release notes and the recommendation to Trilliant and CMP to upgrade all I210+C meters to patch 7.0." Notably, Aclara did not reference "resending" the release notes or suggest the release notes had been provided prior to 2014.

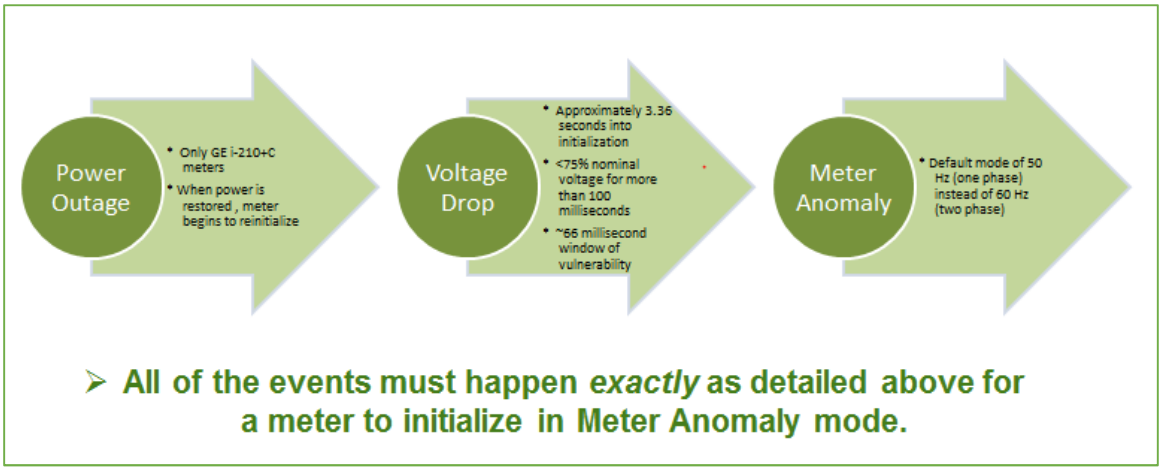
Having no evidence to support that GE sent the meter release notes prior to 2014 and in fact, having Aclara confirm that they *provided* the notes in 2014, there is simply no factual evidence on which to base Liberty's conclusions that CMP received the information prior to the date CMP has documented.

Meter Anomaly Sequence of Events

Please explain how a meter can go into anomalous mode?

The White Paper identified that in very uncommon circumstances following a power outage, a GE I210+C meter with firmware version 2.5.1 patch 6.0 or older may experience conditions that cause it to operate temporarily in an incorrect state. Specifically, the meter must first experience a power outage. When the power is restored, the meter reinitializes its settings and at approximately 3.36 seconds into the initialization, the meter must experience a voltage drop of greater than 25% lasting at least 100 milliseconds. This translates to an approximate 66 millisecond window of vulnerability during the initialization process for this very uncommon error to occur. The sequence of events necessary for a meter to enter anomalous mode are illustrated below in Figure 1 – Meter Anomaly Sequence of Events**.** Should a specific meter of this type with this version of firmware experience this exact sequence of events, the meter could then operate in anomalous mode until a correction is applied. The correction may be a secondary outage or a manual correction by CMP personnel. While a meter is operating in anomalous mode, the meter clock consistently gains time by 12 minutes per hour; this is the visual symptom by which a meter in anomalous mode can be recognized.

Figure 1 – Meter Anomaly Sequence of Events



Liberty determined that meter anomalies "did not produce material usage recording error overall"[21] during the audited period. Please discuss how the meter anomaly impacts usage registration. Does CMP agree with Liberty's determination that meter anomalies did not materially impact the recording of usage?

Anomalous Mode Potential Impacts

CMP agrees with Liberty's explanation of the potential impact of anomalous mode, as explained on page 26 of the Liberty Report, and its conclusion that the numbers of meters in anomalous mode "are not large enough to have contributed to over-registered usage from November 2017 through April 2018."[22] CMP also agrees with Liberty's explanation that, when appliances are wired according to code, those appliances operating on 240v (typically larger household appliances such as furnace, range, hot water heater, dryer, hot tub, heat pump, etc.) are wired evenly across Phases A & C,

[21] Liberty Audit report, page 20.
[22] Liberty Audit Report, p. 27.

leading to accurate usage registration even when a meter is in anomalous mode. When wired according to code, outlets for 120v appliances (typically smaller household appliances like hair dryers, lights, televisions, small kitchen appliances, etc.) are also evenly balanced across Phases A & C, minimizing the potential impact of anomalous mode. There is potential, if the usage of smaller appliances is not even between the phases, for usage registration to be under- or over- recorded, depending on which phase is powering the outlets being used at any given point in time.

CMP agrees with Liberty's conclusions regarding the meter anomaly that:

- The time windows for the required chain events to induce anomalous operation are extraordinarily small;[23]
- The number of occasions of register-anomaly are also small, particularly when viewed as a percentage of meter days;[24] and
- When locations are appropriately wired according to the NES code, the anomaly makes only a small amount of error likely for any customer.[25]

Please respond to Liberty's statement that "(meter anomalies) are likely to have caused significant over-and under-registration for a very small number of customers."[26]

Liberty acknowledges in its response to CMP-001-001 that it has no practicable basis upon which to conclude that any customer has suffered material over-registration other than observing that it is "inevitable that some surely did." In fact, CMP's analysis of known instances of anomalous mode indicates usage during anomalous mode is

[23] Liberty Audit Report, p. 26.
[24] *Id.*
[25] *Id.*
[26] Liberty Audit Report, p. 27.

consistent with usage outside of anomalous mode at that same location. Further discussion of CMP's analysis is provided below.

Meter Anomaly Did Not Cause Customer Complaints

CMP experienced a number of customer complaints about high usage between November 2017 and April 2018. Were the customer complaints a result of meters operating in anomalous condition?

CMP supports Liberty's conclusion that there is no correlation between a specific meter type and customer complaints of high usage, including the meter susceptible to potential anomaly. In fact, Liberty observed on page 18 of the Audit Report that the data indicates "an extraordinarily close correlation" between the numbers of meters in service and the number of complaints involving that type of meter, meaning customers were equally likely to complain of high usage regardless of the type of meter in service at their location. At the April 5, 20119 Technical Conference, Liberty acknowledged the lack of correlation between a specific meter type and customer usage complaints.[27] The Liberty table "Billing Complaints by Meter Model"[28] is copied below for ease of reference.

[27] See Transcript of April 5, 2019 Technical Conference, p.113
[28] Liberty Audit Report, p. 19.

Billing Complaints by Meter Model

Model Family	Number in Service	Complaints #	Complaints %	Share of Meters	Share of Complaints
GE I-210+c	360,199	1,328	0.37%	55.6%	56.1%
GE KV2c	4,159	15	0.36%	0.6%	0.6%
GE (Unrecorded)	15	0	0.00%	0.0%	0.0%
Landis Gyr AXR	276,049	952	0.34%	42.6%	40.2%
Total AMI Meters	640,422	2,295	0.36%	98.9%	97.0%
Miscellaneous Mech. & Elec.	7,030	72	1.02%	1.1%	3.0%
Miscellaneous	350	0	0.00%	0.1%	0.0%
Total CMP meters	647,802	2,367	0.37%	100%	100%

CMP has continued to receive inquiries from customers who express concerns about their level of usage. Through April 9, 2019, customers associated with 3,288 unique meter numbers have expressed concerns about their usage through the Company's modified high bill complaint process.[29] CMP has updated Liberty's Billing Complaints by Meter Model chart shown above to include customers who expressed usage concerns after the period examined in the Liberty Audit, presented below in Figure 2 – Updated Billing Complaints by Meter Model. Consistent with the Liberty findings, customer complaints of high usage remain in line with the percentage of meter types in service and do not show any correlation to a particular meter type, including the I210+C meters susceptible to meter anomaly.

[29] On February 26, 2018, the CASD requested that CMP implement a special handling process for the customers calling the CASD with high usage inquiries. On February 28, 2018, CMP established a team to resolve customers' questions regarding their higher than usual electricity usage.

Figure 2 – Updated Billing Complaints by Meter Model

Updated through April 9, 2019				
Model Family	**Complaints**		**Share of**	
	#	**%**	**Meters**	**Complaints**
GE I210+c	1,816	0.50%	55.6%	55.2%
GE KV2c	36	0.87%	0.6%	1.1%
GE (Unrecorded)	0	0.00%	0.0%	0.0%
Landis Gyr AXR	1,238	0.45%	42.6%	37.7%
Total AMI Meters	3,090	0.48%	98.9%	94.0%
Miscellaneous Mech. & Elec.	198	2.82%	1.1%	6.0%
Miscellaneous	0	0.00%	0.1%	0.0%
Total CMP meters	3,288	0.51%	100.0%	100.0%

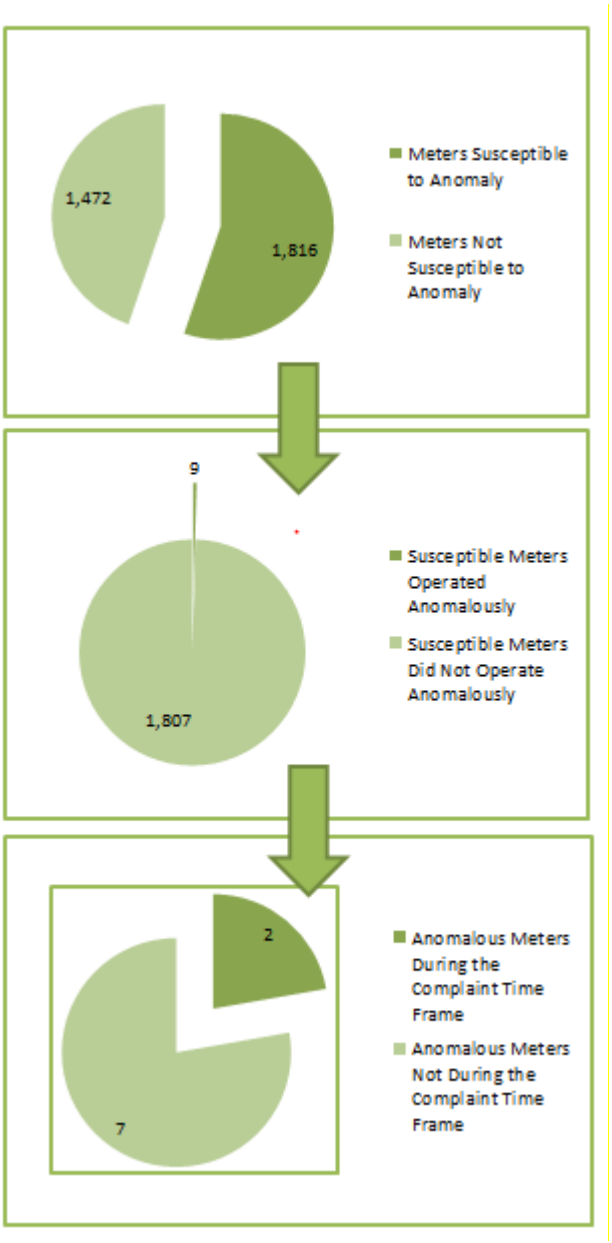
CMP also analyzed usage patterns for the 3,288 meters associated with customers who have complained of high usage through the Company's modified high bill complaint process to determine whether those customers with the meter type susceptible to the anomaly could have been in anomalous mode during the same time frame when they were concerned about their usage. Of the 3,288 meters, 1,816 or 55.2% are of the meter type susceptible to the anomaly, while the other 44.8% are from customers with meters not susceptible to the meter anomaly.

CMP first checked each of the 1,816 meters which could potentially experience the meter anomaly against its confirmed meter anomaly reports. Next, CMP examined its Clock Drift reports, since for a meter to be in anomalous state it must first appear to be in Clock Drift. CMP further examined meter data for these meters to identify missing meter reads, which may also indicate anomalous mode. CMP was able to determine that of the 1,816 meters which could potentially experience the meter anomaly, only 9 have experienced anomalous mode since the inception of SmartCare. Of the 9 meters which

1 did experience anomalous mode, only 2 were in this mode during the time period in
2 which each customer complained of high usage. This analysis, illustrated below in
3 Figure 3 – Anomalous Meters with Usage Concerns, further confirms that there is no
4 correlation between anomalous meter operation and customers complaining of high
5 usage.[30]

[30] In response to this recent analysis, CMP intends to evaluate further the usage of these two customers to assess whether they likely were materially impacted by the fast clock anomaly. If that is the case, the Company intends to follow Section 12.5 of its Terms and Conditions and Section 8(E) of Chapter 815 of the Commission's rules regarding metering and billing errors and make any appropriate bill adjustments. Similarly, CMP is in the process of evaluating other CMP customers who also may have been materially impacted by the fast clock anomaly and will work with those customers to make any appropriate bill adjustments.

Figure 3 - Anomalous Meters with Usage Concerns



CMP agrees with and supports Liberty's conclusions that customer's high usage and high bill complaints during the period of November 2017 through April 2018 are attributable to the cold weather and supply price increases experienced during that time frame. Further, that there is no correlation between meter type and high usage or

between meters operating in anomalous mode and customer complaints. This analysis and its conclusions should be applied on a forward basis as well as to the tested period, concluding that overall, meter type and meter anomaly mode do not contribute to customer complaints or high usage.

How have usage calls traditionally been handled at CMP?

CMP typically experiences an increase in customer calls with usage concerns as seasons change or when there is significantly hotter or colder weather, such as what was experienced in the winter of 2017. It is not unusual for customers to have questions about their usage and to question how and why their usage has changed. Historically, when a customer complains of high usage or a concern that a meter may not be registering usage accurately, CMP discusses with the customer what is being used in the household, asking questions and suggesting things that have caused other customers to experience higher usage. Usage conversations with customers have identified things like faulty hot water heaters if an element has gone bad, a sump pump or well pump running more often, heat tape having been added to avoid frozen pipes, electric heaters being used, particularly if a customer runs out of or low on oil or propane, along with more universal factors such as the onset of winter and shorter daytime hours or hot summer days with air conditioning being used.

While CMP does its best to assist customers in identifying the source of their usage, CMP is not able to definitively tell customers what is being used within their own homes. Instead, CMP often encourages customers to use its Energy Manager portal to see daily and even hourly usage trends, so that customers can understand the days/times of their usage variations. Customers are also encouraged to make use of tools such as the Home

Energy Calculator and the Company's Usage Alerts, to better understand their usage. Customers may also request to have their meter tested to ensure their usage is being accurately recorded.

As discussed previously in this testimony, CMP tests more than 14,000 meters each year, with 99.9% of meters testing within the established tolerance limits of +/- 2%. Customer Service Representatives share with customers the low likelihood of a faulty meter being the cause of a usage concern, so that customers continue to troubleshoot and investigate potential causes of usage in their own home.

Historically, if a customer complains of high usage and a subsequent meter test confirms that the meter is measuring usage accurately, the Commission has found it appropriate to hold the customer responsible for recorded usage, *even if the customer disagreed or could not pinpoint the appliance causing the usage in question.*[31]

As concluded by Liberty's Audit of the CMP metering and billing systems, CMP's meters have been conclusively tested and confirmed to be accurately recording customer usage. Further, the highly unusual instances of meter anomaly have not caused usage concerns or driven customer complaints. The Company believes that the factual documentation and extensive analysis in this case provides no basis for deviation from the Commission's historical policy of holding customers responsible for their accurately recorded usage.

[31] *See Maine Public Utilities Commission, Appeal of Consumer Assistance Division #2006-21676 (By Customer) Regarding Central Maine Power Company*, Docket No. 2006-648, Order (Nov. 21, 2006)*; see also Maine Public Utilities Commission, Appeal of Consumer Assistance Division Decision By Customer of #2010-30588 Regarding Rangeley Water District*, Docket No. 2011-45, Order (Mar. 22, 2011) stating, "The Commission has consistently held that absent a defective meter, a customer is responsible for paying for usage recorded on the meter."

Eliminating Vulnerability to Meter Anomaly

Liberty identifies resource constraints as a reason CMP did not document meter anomalies more consistently. Did CMP experience resource constraints that prevented it from taking the necessary steps to correct meter anomalies in a timely manner?

CMP has an established process to reset meters when a meter fails to self-correct its time, according to the steps outlined in the 2014 Engineering Analysis Report. As Liberty correctly notes, the process was applied less rigorously prior to 2018. However, contrary to Liberty's conclusion that time constraints or resource inadequacy was the cause of the less rigorous resets,[32] the Company notes that the process was less rigorous because until 2018, *the Company had no reason to believe anything other than the date and time was being impacted.*[33]

In early 2018, when the Company identified the 352 meters in clock drift and began discussions with the meter manufacturer, CMP modified its established process to require the task to be completed every work day, out of an abundance of caution while it awaited guidance from the meter manufacturer. This daily process now ensures that meters found to be in anomalous mode are corrected promptly.

Liberty correctly observes that the reset process is a temporary fix and that corrected meters could go into anomalous mode again, if, in the future, the uncommon series of events causing the meter anomaly were to re-occur to the same meter.

How does CMP intend to prevent meters from operating in anomalous mode in the

[32] Liberty Audit Report, p. 25.
[33] Liberty also suggests CMP should have considered replacing the vulnerable GE meter population beginning in 2014. As discussed previously, in 2014 CMP was aware only that meter clocks may be incorrect, so there was no logical reason to consider replacing the meters at that time.

future?

CMP is pleased to confirm that it has completed an upgrade to its AMI Head End System, which was a critical first step to achieving Over-the-Air ("OTA") meter reprogramming capability. OTA reprogramming will allow the Company to deploy the necessary meter firmware patch to permanently eliminate the vulnerability for the specific meter type susceptible to the meter anomaly.

With the Head End System upgrade completed, CMP anticipates beginning to deploy the necessary firmware updates to meters in May 2019, followed by deployment of meter programming updates beginning in June 2019. CMP expects to complete all OTA meter reprogramming by November 2019, which will permanently eliminate vulnerability to potential meter anomaly.

CMP's Bills Accurately Reflect Customer Usage and Utilize the Appropriate Rates

Is CMP billing customers accurately for their usage and do those bills use the appropriate rates? Please explain any exceptions when this might not have been the case.

As noted above, the Liberty Report found, and CMP agrees, that CMP's AMI meters are and have been accurately recording customer usage and are consistently communicating that usage to the SmartCare system for billing.

There have been three defects identified within the SmartCare system that have caused customers to be billed based upon inaccurate usage.

- 35 customers who were generating some of their own energy were billed with an incorrectly high amount of generation, causing the account balance and the banked generation to be incorrect for 22 of the customers. The coding error

was corrected, billing corrections were completed and Customer Service Guarantees were applied.

- 54 customers who had their meter exchanged were not billed for usage recorded on the removed meter from the previous meter read date to the exchange date, due to human error in processing the meter exchange. The customers were not back billed for the unbilled usage.

- 15 commercial customers with self-generation and a specific type of legacy meter were billed an incorrectly low demand charge due to a coding error; the amount of energy consumed was billed correctly. A coding error was corrected, the 15 customers were not back billed for the additional demand charges, and Customer Service Guarantees were applied.

With the exception of these three cases, CMP's bills have accurately reflected customer usage.

CMP is not aware of any system problems causing customers to be billed incorrect tariff rates for their usage, nor did the Liberty Audit identify errors causing customers to be billed incorrect rates for their usage. Ongoing testing and bill analysis is completed as part of the Company's internal verification process when new rates or charges are being implemented. When errors are identified, the Company works to identify and implement the necessary coding changes so that customer bills may be corrected.

There have been two errors which led to customers being charged incorrectly for late payment charges and one error which led to some customers being billed without the appropriate supplier charges.

- 182 customers were incorrectly charged late payment charges on newly billed security deposits which had been set up on payment arrangements. The coding error was corrected, the late payment charges were reversed and Customer Service Guarantees were applied.

- From January 2, 2018 through January 11, 2018 customers were incorrectly under charged late payment charges of 0.911% rather than the new 2018 rate of 0.968%, a total under charge of $8,314. The rate was changed on January 12, 2018 and the customers were not back billed for the corrected amounts.

- 108 accounts were not billed supplier charges from November 10, 2017 to January 25, 2018 due to a coding error. The coding error was corrected, accounts were rebilled with the appropriate supplier rates and Customer Service Guarantees were applied.

There have been a limited number of defects which have caused some customers in unique circumstances to be charged incorrect fees or to not be charged fees that should be charged.

- Customers who receive an Electric Lifeline Program (ELP) benefit and opted out of having an AMI meter should be billed a discounted opt-out fee. 22 customers who were newly enrolled in ELP were charged the full opt-out fee in error. The coding defect was corrected, the appropriate credits were applied to all affected customers' bills and Customer Service Guarantees were applied.

- Customers who participated in the Maine Green Power Program ("MGP") or who elect to contribute to the Maine Renewable Resource Fund ("MRRF"), and who changed their Competitive Electricity Provider ("CEP") choice, were incorrectly not billed for MGP or MRRF following the CEP change. Corrections were made for future bills and the 197 customers affected were not back billed for the missed MGP and MRRF contributions. CMP made a $500 contribution to MGP and a $250 contribution to MRRF to remedy the error.

- A system error continued the billing of a smart meter opt-out fee after a tenant change, even when the new tenant had not opted out. Corrections were made to remove the incorrect fees from affected customer accounts.

- Landlords who opted to have services automatically revert to their name when a tenant moves out were not charged the appropriate customer connect charge when services reverted. The coding correction was made and the 6,479 landlord accounts were not back billed the connect charges.

With the exception of the limited situations described above involving specific fees, CMP customers are being billed the correct and appropriate fees and rates for usage in accordance with CMP's Electric Delivery Rate Schedules and its filed Terms and Conditions.

CMP's SmartCare system creates a specific exception to identify when the system is unable to calculate an accurate bill; the exception is known as an Out Of Balance ("OOB") condition. An OOB is most typically when the line items on a specific customer invoice do not total to the actual amount due, usually due to a coding defect. When the system identifies an OOB, an exception is created which allows CMP to correct the bill before it is issued to the customer.

With the exception of OOB situations, CMP's bills are accurately calculating total customer bills. The Liberty Report supports this conclusion, with Liberty matching delivery and supply charges with CMP's billed delivery and supply charges, 99.9% and 99.8% of the time, respectively.[34]

As part of its Procedural Order dated April 26, 2019, the Hearing Examiner requested that CMP provide as part of this testimony its analysis of bills that were not reconciled by Liberty and "specifically identify those bills which contained billing errors, the errors identified, (incorrect rate categories, supplier codes, etc.), the actions taken by the Company to correct such errors, and any refund to customers for overcharges. For those bills identified where the amounts can be reconciled, the Company should identify the specific data issues which explain the initial differences. Finally, CMP should identify bills which have not either been determined to be erroneous or reconcilable." Please provide an update on the status of the requested bill reconciliation.

[34] Liberty Audit Report, p. 49.

On the week of April 26, Liberty uploaded the exceptions to its Shared Site. CMP attempted to locate the uploaded Excel file for review. After several attempts to access the data, Liberty had to relocate the data file to a prior folder based on security access limitations. As of April 26, 2019 CMP gained full access to the 8,300 customer accounts to be reconciled.

CMP is moving forward with the review of the 8,300 accounts which represents over eleven thousand individual invoices. CMP will review these accounts in the same manner as was done with Liberty in previous reviews. Once the variable pricing logic is located, the invoice line item is documented in Excel. Each line item includes documentation of the exception variable.

CMP anticipates the review to be an ongoing process. Resources have been assigned to this complex review for the eleven thousand invoices and the Company expects completion by June 26, 2019.

D. Accurately Identifying Billing Errors

Liberty observed that "most utilities implementing new customer information systems experience billing issues post-implementation,"[35] Please discuss and explain CMP's processes to identify, respond to and remediate billing issues.

CMP's SmartCare system offers CMP the ability to set specific parameters to automatically review billing components (including customer usage and historical spend/dollar values) to check for accuracy and plausibility. This review creates billing exceptions, and exception management is a standard job function in CMP's Billing Team.

[35] Liberty Audit report, page 85

In a mature system, exceptions can be examined, corrected and cleared without resulting in significantly delayed customer bills. As the system performs these checks during the billing process, a number of billing exceptions are created and sent to the Billing Team for review before the bill is released to the customer. Billing exceptions demand personal attention and every day CMP's Billing Teams works to resolve billing exceptions and deliver accurate and timely invoices to customers.

Despite the Company's efforts to resolve exceptions and avoid incorrect bills being sent to customers, there have been occasions where some customers have received bills containing an error. Some errors are material to a customer and impact the dollar amount due from the customer. Other errors are "presentation errors", which impact messaging on a customer's bill or other non-monetary information presented on a bill.

Errors Are Being Addressed Appropriately

CMP remains committed to providing its customers with accurate and timely bills, consistent with CMP's historical performance. When errors are identified, the Company addresses them promptly, working to identify the cause and, if the error was caused by a system defect, the appropriate code correction needed. CMP is striving to resolve all exception cases impacting billing within a 30 day time frame. The Company is also committed to mitigating and correcting any negative customer impacts from errors. CMP has taken the following steps, as appropriate to each unique situation, in response to the errors identified:

- Issuing corrected bills for overcharges;
- Providing agents with information about the error, should customers call to inquire;

- Communicating with affected customers about the error using a variety of methods, including bill messages, letters and outbound customer calls;

- Applying Customer Service Guarantee credits where appropriate;[36]

- Suppressing late payment charges and dunning activity where appropriate; and

- Offering payment arrangements or extended repayment terms where appropriate.

Delayed Bill Process

Does CMP Give Customers With Delayed Bills Special Consideration?

CMP has given customers with delayed bills special consideration.

1. CMP codes accounts with delayed bills to ensure that no credit and collection actions will be taken on the customer's account during the time a bill is delayed or in the months after a delayed bill has been released.

2. CMP has periodically made automated outbound calls to all customers experiencing delayed bills, apologizing for the delay and letting them know that the Company was aware that they have not received a bill.

3. CMP codes the accounts with delayed bills to divert the bills back to the company when they are released.

4. The Company put a credit on the accounts of the customers equal to $10 per bill that was delayed.

5. CMP bundles multiple bills together and send them in a single envelope to the customer, along with a letter that apologizes for the delays, explains the credits and advises the customer that they will have additional time to make payments on the bill and encourages the customer to contact CMP to set up an affordable payment arrangement.

6. Some customers that did not receive a bill as a result of a system problem upon move-in received live calls from Customer Service Representatives.

[36] Section 18.12 of CMP's filed Terms and Conditions provides that the Company may implement a Customer Service Guarantee program under which the Company will give a customer a credit for failing to promptly and accurately perform certain functions.

7. CMP has coached call center representatives to set up generous payment arrangements that work for customers that experienced delayed bills.

III. Conclusion

Does this conclude your testimony?

Yes, it does.

Linda Ball

Work History ***Central Maine Power Company,*** Augusta, ME

2018 to present **Director, Smart Metering, Avangrid Service Company**

- Responsible for automated metering and related activities for Avangrid Network companies.

2012 to 2018 **Manager, Customer Relations Center, CMP**

- Managed contact center for CMP, responding to customer inquiries via multiple channels to achieve service metrics and ensure customer satisfaction.
- Responsible for departmental workforce management and statistical reporting.

2011 to 2012 **Supervisor, Customer Billing, New York State Electric & Gas (NYSEG)**

- Supervised team of union and non-union employees supporting specialized billing, exception management, and other back tasks to provide timely and accurate bills to customers.
- Managed departmental SOX compliance and statistical reporting.

2004 to 2011 **Lead Analyst, Customer Relations Center, NYSEG**

- Workforce management for customer relations center to ensure adequate staffing to manage customer inquiries according to SQIs.
- Developed and managed statistical reporting.

2000 to 2004 **Analyst, Regulatory Affairs, NYSEG**

- Supported regulatory filings and rate cases.

1996 to 2000 **Customer Service Representative, NYSEG**

- Responded to customer inquiries via multiple

channels. **Education**

MBA, University of Strathclyde and Comillas University, 2017
Bachelor of Science, Business Administration, LeMoyne College, 1987

Jayme Holland

Work History ***Central Maine Power Company***, Augusta, ME

2018 to present **Manager, Customer Service Quality**

For the operating companies of Avangrid:

- Manage regulatory and other escalated complaints in compliance with regulatory protocols.

2012 to 2017 **Manager of Projects and Programs**

- Managed implementation of projects providing customer access to smart meter-enabled products and services.

MEP Management Services, Inc., Augusta, ME

1999 to 2012 **Director, Planning and Evaluation**

- Developed strategic plans, operating plans, budgets and metrics and acted as the liaison for five federally funded non-profit organizations in the National Institute of Standards and Technology's Manufacturing Extension Program.
- Managed program evaluation activities including surveys and program reviews using the Malcom Baldrige Excellence Award criteria.

Maine Manufacturing Extension Partnership, Augusta, ME

1997 to 1999 **Program Analyst**

- Led the development of a based project tracking and reporting database.
- Implemented processes for qualitative and quantitative program evaluation.

Tyler Technologies, Falmouth, ME

1996 to 1997 **Technical Support Representative**

- Provided technical support for municipal accounting software.
- Provided training for use of utility billing software.

Portland Housing Authority, Portland, ME

1994 to 1996 **Accounts Clerk**

- Managed payments made to Section 8 landlords and receivables for public housing tenants.

Education

Master of Policy and Management – University of Southern Maine (2002)

Bachelor of Arts, Political Science - University of Maine, with distinction (1992)

Certificate, Project Management - University of Southern Maine (2015)

Harvard Negotiation Institute (2015)

Nicholas Levesque

Work History *Central Maine Power Company,* Augusta, ME

2017 – Present – Regional Operations Customer Service, CMP

- Manage union and non- union staff performing field meter work and back office exceptions processing, meter lab operations, safety test lab operations and technical metering operations across CMP.
- Responsible for departmental workforce management.

2016 – 2017 Manager – Regional Operations Customer Service, CMP

- Manage union and non- union staff performing field meter work and back office exceptions processing across CMP.
- Responsible for departmental workforce management.

2010 - 2016 Supervisor – Field Customer Service, CMP

- Supervised team of union employees supporting back office clerical exceptions management, meter reading, meter field work including turn off, turn on, new connections, etc.

2007 - 2010 Analyst – Marketing & Sales, CMP

- Advising residential and small business customers on rates and options
- Handling customer complaints for assigned division(s)
- Street Light Sales
- Municipal Advisor

2006 - 2007 Meter Clerk, CMP

- Meter dispatching and meter reading exception reports.

2005 - 2006 Revenue Data Recorder, CMP

- Reading all types of electric meters.

Education

MBA, Husson University, 2015
Bachelor of Arts, Political Science, University of Southern Maine, 2005

Mark A. Morisette

Work History — Central Maine Power Company (CMP) / Avangrid

2018-present ***Manager, Smart Metering***

- Responsible for all aspects of the operations for metering systems, including Meter Data Management System (MDMS), MV90, the Electronic Meter Reading System (FCS), and aspects of the Trilliant AMI Head End System
- Provide direction and leadership to a team of highly skilled professional and technical staff
- Responsible for robust enterprise operational governance processes, maximizing system performance, availability and all compliance requirements

2010-2018 ***Manager, SAP Support***

- Responsible for the management of the full software development life cycle of projects/programs in SAP CCS applications (e.g. Call Center, Device Management, Credit and Collections, Billing and Retail Access)
- Provide direction and leadership to a large team of functional and technical resources to address complex business issues
- Provide project management, leadership and guidance for large and diverse corporate projects, including communications to a wide corporate and global audience, at multiple levels of the organization

2004-2010 ***Manager, SAP Programming***

- Responsible for the management of the full software development life cycle of all aspects of SAP development
- Provide direction and leadership to a team of technical resources to address complex business issues
- Provide project leadership for large projects

2002-2004 ***Manager, Applications***

- Responsible for all application development efforts including project planning and management, prioritization of new and outstanding issues, assignment of resources and production support for the applications supported by the Customer Systems group
- Provide leadership to various corporate projects

1999-2002 ***Senior Business Systems Analyst, Customer Systems***

- Responsible for implementing solutions to meet business needs, working at the highest level of all phases of systems development
- Technical Architect and Release Manager, Competitive Infrastructure Project responsible for developing design templates for each of the functional business areas of CMP's Customer Service System; included the setup and management of change control for all changed application modules

1992-1999 ***Programmer I - Senior Programming Analyst, Customer Systems***

- Senior Analyst / Lead, Year 2000 Project, responsible for all analysis and design work, including the mentoring and training of programmer trainees
- Senior Programmer Analyst, Computer Telephony Integration (CTI) Project responsible for programming a link between the phone systems and the desktops within the Call Center, allowing for the passing of call data, including screen pop
- Lead Programmer Analyst, CSSGUI Project, involving the creation of a GUI front-end to CMP's legacy CICS-based Customer Service System (CSS); created technical specifications and constructed many Visual Basic forms to support the development effort

Education

MS, Computer Information Systems – New Hampshire College 2000, *summa cum laude*
MBA - Thomas College 1993 *cum laude*
BS, Computer Information Systems – Thomas College 1992, *summa cum laude*

EXHIBIT 2 – CONFIDENTIAL

EXHIBIT 3 – CONFIDENTIAL

EXHIBIT 4 – CONFIDENTIAL